New Series for GDP per capita, per worker, and per worker-hour in Portugal, 1950-2007

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April 2009

Introduction

International databases providing a vast array of information on the various national economies of the world have become increasingly more comprehensive and reliable. We now have available various databases tracking the very long-run economic performance of the world, sometimes back to the year 0 (as in Maddison, 2006, which had as predecessors, Maddison, 1989 and 1995). It is not just in chronological and geographical extension that the databases have been improved, but also in the quality of the underlying data. Such databases as that of the Groningen Growth and Development Centre (GGDC, see GGDC) or Eurostat's Ameco (see Eurostat) tend generally to use the latest national updates on historical statistics and even official data. The usefulness of such exercises is obvious. We are now able to compare the performance of a large number of economies for substantially long periods of time.

There is, however, a slight drawback in these exercises, which is to give the feeling to those using them that they are the source of absolutely rigorous statistical material. In reality, fundamental data to build historical statistics are sometimes absent, being frequently replaced by arbitrary assumptions and decisions. Historical series are sometimes just hypotheses on the evolution of certain economies, rather than precise descriptions. Consequently, caution should be the rule in the use of such databases.

One might believe that the closer one is to the present and to the more developed economies of the world the more reliable the data provided by national statistics offices would be. However, in this paper I reveal basic data problems regarding Portugal in the 1960s and 1970s. These are important problems because they impinge on the picture to draw of the Portuguese economy during both its golden age of the 1960s and its

slowdown of the mid-1970s. Additionally, they pose serious questions as to the reliability for that period of the two most important international datasets currently available, Ameco and GGDC.

As a matter of fact, Ameco and GGDC present two contrasting pictures of the performance of the Portuguese economy in that period. Although they display virtually no difference in terms of GDP per capita (Figure 1), the same is not true of GDP per worker: Ameco shows a level consistently below GGDC from 1960 to 1990 (Figure 2) and, consequently, also shows higher rates in the same period, mostly between 1973 and 1986 (3.01% versus 1.1%) (Table I). These differences lead to two entirely different stories regarding the performance of the Portuguese economy during the mid-1970s slowdown. Whereas GGDC data indicate a paltry Portuguese performance in terms of productivity from the mid-1970s to the mid-1980s, Ameco's indicate the opposite.

Since there are no major differences in the record of GDP between the two databases, the root of the divergence must be in employment data. Figure 3 shows the notable differences between the employment series of the two databases. In 1960, Ameco's starting year, its level is of about 4.5 million employed persons; GGDC's is of about 3.5 million, *a difference of 1 million, or more than 10% of the total Portuguese population in that year*. It is not easy to know how the two employment series were built, but it is easy to imagine the main reason for the divergence. An old *vexata quaestio* for students of the Portuguese economy for the period between the 1960s and the 1980s is the low quality of the official Portuguese demographic statistics, particularly the 1970 census. This was noted by various authors (such as Cónim, 1978, and Nazareth, 1984) and recognized by the *Instituto Nacional de Estatística* (INE) itself, which in 1980

published a new (corrected) total population series for the period between 1940 and 1980 (INE, 1980). The quality of the original statistical data prevents the construction of a good basic series. It also poses serious challenges to anyone trying to build any sort of estimate. The "creativity" shown by Ameco and GGDC demonstrates it.

In order to tackle this problem I decided to search for information that could improve the available series. In the process, I realized that "creativity" has not been exclusive to the builders of international data sets, but also to those of national ones, and that much room for improvement exists. With this in mind, I offer what I consider to be more reliable series for population, employment, hours of work and, consequently, of GDP per capita, per worker and per worker-hour in Portugal from 1950 to 2007. This paper provides a description of the methods followed to build the new series.

The remainder of the paper is arranged as follows.

In Section 1, I discuss the drawbacks to the existing population, employment, and hours of work series, both at GGDC and Ameco, as well as in various national sources. I then suggest a new manner of determining those series and present the results.

In Section 2, I use the new series to calculate a new set of series for GDP per capita, GDP per worker and GDP per worker-hour. The results are different from both GGDC and Ameco, although essentially confirming the picture coming from the latter in relation to the slowdown years: a stronger slowdown in GDP per worker and per worker-hour than in GDP per capita.

In Section 3, I discuss the practical implications of the differences between the various series, by comparing them with the Spanish economy. Whereas the Ameco data imply an essentially similar story between Portugal and Spain, with both countries

slowing-down at the same pace both in GDP per capita and in GDP per worker, the GGDC and the new data suggest that in Spain there was a much stronger slowdown in GDP per capita than in GDP per worker, whereas in Portugal they were very similar.

1. New series for total population, active population, employment, and hours of work

As we have seen, AMECO and GGDC give contradictory indications for the performance of the Portuguese economy from 1950 to 2007, in particular during the crucial slowdown years of the mid-1970s. The differences come from employment data, where "creativity" has been abundant. It is not possible to know where Ameco's employment data came from, since no explanatory notes are available at Eurostat's site. As for GGDC's, the explanatory notes tell us that they came from various issues of OECD's *Labour Force Statistics* (OECD, various years).

But "creativity" has not been limited to the builders of international data sets. The same has happened in Portugal. Figure 4 shows the two most recent efforts to reconstruct total population numbers in Portugal between 1950 and the 1990s, one by Pinheiro (1997) and the other by Baganha and Marques (2001). Figures 5 and 6 show a few efforts referring to active population and employment (by Nunes, 1989, Pinheiro, 1997, INE, 1974-1982 and 1983-1994, in addition to the original census figures, given in Nunes, 2001). It is certainly not easy to extract a clear picture from this contradictory collection of information.

Starting with total population and the Baganha and Marques (2001) series, we can identify a few serious problems. The first is that they take for granted the data coming

from the censuses, which, as noted above, are rife with errors. The second is that the annual figures are not genuine annual figures, but rather linear interpolations between the 1960, 1970, 1981, and 1991 censuses figures. This is a legitimate exercise, of course, and even a potentially correct one, in the absence of other information. The point is that there is more information available. The original official figures were corrected by Cónim (1978) not only for the 1960 and 1970 census years, but also for the intermediate years. This was not just a casual and inconsequential revision, but one that turned out to be adopted by INE from the 1980 Statistical Yearbook (INE, 1980) onwards.

Another problem is that the linear interpolation method, although statistically correct, does not take into account some important events that do not fit the simple decennial logic underlying it. We know that population declined during the 1960s and early 1970s due to two combined effects: a surge in emigration (see Table II), involving the departure of more than one million persons from the country from 1960 to 1973 (or *the equivalent of more than 10% of total population*) and the large deployment of soldiers to the African Colonial Wars between 1961 and 1974: in the final years of the war, between actual conscripts and deserters, about 90,000 young men were enrolled for action in three different theaters of war, *the equivalent to roughly 1% of total population* (see Table III).

We also know that total population increased greatly from 1974 to 1976 (about 600,000 persons in three years, or *the equivalent to roughly 6% of total population*), resulting mostly from the return of colonists living in Africa and then fleeing to mainland Portugal when the colonies gained independence. The linear interpolation effect, consequently, introduces an unwarranted break in 1970. In fact, emigration slowed

decisively only from 1974 onwards, and the return of the colonists started only in that same year and accelerated in 1975 and 1976. Any reliable series must take these features into consideration.

As for active population, the available series also pose extremely serious problems. Starting from rather similar levels in 1950, the Nunes (1989), Pinheiro (1997) and census series diverge only slightly in 1960 but are totally incompatible in 1970, with a difference between the lowest level (from the Nunes, 1989 series) and the highest (from that of Pinheiro, 1997) of about *half a million persons* (the equivalent to *more than 5% of total population*). Given the census figures it is not exactly easy to understand the origin of Nunes' (1989) benchmark figures for 1960, 1970, and 1981. We know that there was a decline in population between 1960 and 1970 and that this decline was essentially due to emigration and military deployment. Since both movements involved mostly men of an active age, they should have had a strong impact on the active population numbers. But Nunes' (1989) figures seem a bit too low, as well as difficult to ground in hard data. The census figures also allow for a decline in active population and should at least have been used as a benchmark for interpolation. This problem is compounded with the use, again, of the linear interpolation method. As occurs with total population, there is no reason to believe in a break in the series in 1970. Quite the contrary, there are reasons to believe in a continuation of the previous trend, with a break taking place only in 1974.

Pinheiro (1997) did not adopt the original census figures for total population, but the Cónim (1978)/INE(1980) ones instead, thus correcting the first's main errors. The problem here refers to active population. It is not easy to understand why, according to Pinheiro (1997), despite a decline in total population between 1960 and 1970, active

population not only continued to increase, but increase very quickly. The implicit participation rate jumps about 5 percentage points between 1953 and 1973. Although we may presume a slight increase in participation as a consequence of labor scarcity, such a large figure is highly unlikely. Population declined mostly due to the abandonment of the country by a large number of active men (either emigrating or being mobilized into military service abroad), but the variable that should have reflected this shows an increase. Additionally, the Pinheiro (1997) series shows a decline of active population between 1974 and 1976, precisely at the time of the ex-colonists' return (as mentioned above, a population influx of about 600,000 persons, most of them active), of the abrupt slowdown in emigration and of the end of military deployment for the Colonial Wars. It is difficult to understand how and why active population would decline so significantly under these circumstances. These figures are particularly puzzling when we consider that Pinheiro (1997) adopted the corrected total population data.

The problems with active population data do not stop here, as revealed by the INE (1974-1982 and 1983-1994) series for the period between 1974 and 1994 shown in Figure 5. This extra series shows a very anomalous behavior between 1983 and 1991, in what seems to be a statistical record error. This is an additional difficulty in order to have a complete picture for the full period between 1950 and 2007.

Clearly, then, full and coherent series for total population and active population in this period are impossible to obtain by simply collecting data from existing sources. Some process of construction has to be used instead. Due to the implausibility of the existing series, room for improvement is ample and that is what I offer here.

As a first step, I adopted the corrected figures for total population given in Cónim (1978) and INE (1980) for the period between 1950 and 1980. This series was then chained with the official figures for the period between 1980 and 2007 given on the INE site (see INE). The results are presented in Figure 7 and compared with the existing series. The new series is essentially similar to Pinheiro's (1997) until 1981, something that is not surprising, since their fundamental data are the same. From then on, however, they diverge, with the official figures declining mildly until the early-1990s and then increasing strongly, whereas the Pinheiro (1997) series continues growing until 1995. The two series are significantly different from that of Baganha and Marques (2001). This is understandable, as the latter is a linear interpolation of the official census figures. In general, the effect of the new series is to shift the figures upwards. In the late-1960s the difference between the two series reaches about 500,000 persons. The two sets of data converge only in 1974. A clear advantage of the new series is the avoidance of linear interpolation. Thus, it does not only reflect the most important population movements of the 1960s, but also those of the mid-1970s. The new series does not show the sudden break in 1970 nor the artificial regular growth between censuses. As described below, due to these more realistic features I used it as a benchmark to determine active population.

We should pause to understand better the main principles used in Cónim's (1978) revision of total population and the effects in comparison with the official figures. The wish was to include population movements that had been underreported in official statistics, especially illegal emigration and definitive returns of former emigrants (which can be easily confounded with regular short-term movements at the borders), as well as

another population movement that (as a result of its own peculiar circumstances) was also underreported: the return of colonists from Africa. This, together with the suspicion that the 1960 and 1970 censuses (especially the latter), were surveys of very poor quality, led Cónim (1978) to reconstruct data for total population (see also INE, 1980, and Nazareth, 1984). The method was to combine the official yearly statistics for births and deaths with the official statistics for legal emigration, plus some estimates for illegal emigration, emigrants' returns and colonists' returns, all corrected with data provided by the 1975 and 1976 electoral censuses (for details, see Cónim, 1978).

Neither Cónim (1978) nor INE (1980) provided a corrected active population series, and as a result, I built a new one, in four steps. First, I interpolated linearly between the official census figures for active population for 1950, 1960, 1970, and 1981, in order to have a continuous series. I decided to build this new series rather than use Nunes' (1989) due to the problems identified above. Second, I derived the participation rate by finding the ratio of the new series over the Marques and Baganha (2001) total population series. Since the source used in both is the same (the censuses), their errors (namely the undervaluation of the population size) should at least be consistent among them. Additionally, the method followed to find the inter-censitary figures (linear interpolation) was the same. I thus obtained a continuous participation rate series. In a third step, I applied this participation rate series to the corrected total population series in order to obtain a continuous series with absolute figures for active population between 1950 and 1981. In a final step, I chained this series with those coming from Pinheiro (1997) for the period between 1981 and 1992, and then with the official figures given in the INE site for the period between 1992 and 2007. Pinheiro's (1997) figures seem to be

reliable for the 1981-1992 period, since they are a plausible correction of the series given by INE (1974-1982 and 1983-1994). The series thus obtained is presented in Figure 8 and compared with the other series previously available.

The new series presents various advantages over the existing ones. First, although built indirectly for the most difficult period (1950 to 1981), it uses as a benchmark the more realistic total population series given in INE (1980). Since participation rates tend to change much slower than absolute figures, the procedure used is preferable to the simple linear interpolation of absolute figures. Then, if we compare its behavior with that of the other series, it reflects the major population movements in Portugal in the period between 1960 and 1981. First, it corrects for the apparent undervaluation of absolute figures in the 1960 and 1970 censuses noted (and corrected) by Cónim (1978). Second, it presents a much higher overall level than the Nunes (1989) figures. Third, and contrary to the unexplainable ascending movement between 1960 and 1974 given by Pinheiro (1997), it incorporates in active population the decline in total population given by the corrected figures. Fourth, it shows a sudden increase in active population between 1974 and 1976, something that is much more plausible than the sudden and constant increase from 1970 to 1981 given by Nunes (1989), but also more plausible than the decline between 1974 and 1976 given by Pinheiro (1997). Although impossible to claim that this is a perfect series, it seems to improve on the existing alternatives.

Finally, in order to find an employment series (the variable of real interest to build GDP per worker and per worker-hour series) I used the unemployment rate between 1950 and 1992 given in Pinheiro (1997) and applied it to the new active population series. The resulting employment series was then chained with the employment figures given on the

INE site for the period between 1992 and 2007. Figure 9 compares the resulting series with the existing ones.

We are now in a position to compare the employment figures thus found with those in Ameco and GGDC. As Figure 10 shows, the new series is much closer to GGDC than to Ameco, although avoiding some of its less understandable movements at particular points in time, mostly in the critical period between 1960 and the mid-1970s: the GGDC series displays a "syncopated" configuration that suggests an abundant use of linear interpolation. Figure 11 provides a comparison between the employment rates implied by the two data sets and by the new series.

A final element we need in order to complete the picture of labor supply in Portugal between 1950 and 2007 is a series for hours of work. Again, data problems abound. Ameco does not provide any series. As for GGDC, "creativity" seems to have been used again, in the absence of reliable official (or other) data. Figure 12 shows the series provided by GGDC. As explained in the GGDC notes, the series until 1987 is built through a) linear interpolations between the 1950, 1960, and 1973 benchmarks, which were obtained from OECD (various years); b) interpolations from 1974 to 1978 and from 1980 to 1985; c) extrapolation from 1990 to the period 1986-1989, with a trend obtained from OECD (2008); d) direct information from Eurostat's New Chronos database for the period 1990-2007. I offer here an alternative. It is not perfect, but it is at least grounded in more direct data.

Even if there are no series for hours of work in Portugal for the whole economy until 1990, there are figures for weekly working hours in manufacturing from 1956 to 1990 (INE, 1957-1991). In the absence of figures for other sectors, I assumed this series

to be representative of all sectors of the economy. I found its yearly growth rates and then an initial value (in 1956) that, once linked with the growth rates, could be spliced with the 1990 level provided by the New Chronos database used by GGDC. The results for the period between the 1950s and 1990 are clearly different from GGDC. Whereas GGDC shows a continuous linear decline from 1950 to 1990, the new series shows first an increase from the mid-1950s to the mid-1960s, then a mild decline until 1974, then a strong decline until the early-1980s, and finally stability until the end of the decade.

2. New GDP per capita, per worker and per worker-hour series

With the new and better population, employment, and hours of work data, I could finally build new series for GDP per capita, per worker, and per worker-hour. Fortunately, the existing GDP figures are generally considered to be of good quality. Consequently, there was no need for new calculations here, except for chaining the Pinheiro (1997) series (used as a benchmark), which stops in 1995, with the figures given on the INE site for the period between 1995 and 2007. Also, it was necessary to convert the new series into a comparable international unit. I chose PPP 1990 Geary-Khamis dollars, in which all data in GGDC as well as Maddison (1995 and 2003) are given. The same was also done to the Ameco series, which are originally presented in euros.

Figures 13 and 14 show the new series and compare them with Ameco and GGDC. Table I shows the average growth rates for various sub-periods. Using the new population series has the consequence of lowering the level of GDP per capita to a significant extent in the period between 1973 and 1980. However, this is not readily reflected in the average growth rate between 1973 and 1986. The reason for this is that the three series

converge to the same level in the early- to mid-1980s. The consequence is that the decline in GDP per capita in Portugal is much stronger in the new series for the period between 1974 and 1976, but the recovery is also much stronger from 1976 onwards. For the rest of the period, the series are essentially coincident, both in terms of levels and growth.

As for the GDP per worker series, the differences are much clearer. In level terms, the new series starts more or less at the same point as the GGDC series, which is higher than Ameco's. Then, in the 1960s, it diverges and declines progressively to a level somewhere halfway between the Ameco and GGDC series, until 1973. Then, it approaches the level of the Ameco series until the mid-1990s. After the mid-1990s, it declines in relation to both Ameco and GGDC. In terms of growth rates, the result of this path is a slightly lower rate in the 1960s until 1973, in relation to both Ameco and GGDC; a rate somewhere between Ameco and GGDC from 1973 to 1986; a similar rate from 1986 to 2000; and a slightly lower rate from 2000 to 2007. Ultimately, even if the growth rate is higher for the slowdown years of the mid-1970s than in GGDC, the new series confirms the picture of a simultaneous decline both in terms of GDP per capita and GDP per worker, contrary to what was implied by Ameco, where the decline in the growth of GDP per capita was much stronger than the decline in productivity.

The new GDP per worker-hour series is presented in Figure15 and the growth rates are presented in Table I. In the new series, the level of GDP per worker-hour is generally lower than in GGDC. The average growth rate is significantly lower in the 1950s and less so in the 1960s, but is higher in the period between 1973 and 1986. In GDP per worker-hour terms, the result is thus less negative than implied by GGDC for the slowdown years.

3. Practical implications: a comparison with Spain

As shown above, the differences between the Ameco and GGDC series in the 1970s and 1980s lead to two entirely different scenarios with respect to the mid-1970s slowdown of the Portuguese economy. Whereas GGDC data indicate a paltry Portuguese performance in terms of productivity, Ameco's correspond to a respectable one. The consequences for the interpretation of the Portuguese economy's performance in that period can perhaps be best understood if put into a comparative framework. A comparison with Spain shows that, according to Ameco figures, the two economies slowed-down in the mid-1970s essentially in the same manner: both grew very quickly during the 1960s, in per capita as well as per worker terms; then, during the 1970s, slowdown was similarly stronger in both measures. As shown in Table IV, Portugal went from an average growth rate of GDP per capita of 6.43% between 1960 and 1973 to one of 1.21% between 1973 and 1986, whereas in Spain the figures were 5.99% between 1960 and 1974 and 0.87% in 1974 to 1986; in terms of GDP per worker the evolution is similar in the two countries: 6.61% to 3.01% for Portugal between the two periods, and 6.4% to 2.92% for Spain. According to Ameco figures, we would thus have an essentially similar historical performance between the two countries. That is not the case with GGDC data: although decline in GDP per capita is virtually identical between them (6.95% to 1.62% in Portugal from 1960-1973 to 1973-1986, and 7.24% to 1.72% in Spain), it was completely different in productivity terms (6.83% to 1.13% in Portugal, and 7.44% to 3.86% in Spain). In the case of GGDC figures, productivity exhausts the

explanation of Portugal's slowdown, but not Spain's, where a still respectable productivity performance was not reflected in GDP per capita.

These contradictions show that, depending on the dataset used, one extracts entirely different conclusions on the comparative behavior of the Portuguese and Spanish economies. According to Ameco figures, the two economies' slowdowns were not due to serious productivity problems, but rather to employment problems. According to GGDC figures, this is Spain's problem only, because in Portugal the problem is essentially one of productivity rather than employment. The lessons to draw are consequently entirely different.

The new series presented in this paper, although marginally improving the productivity performance of the Portuguese economy, confirms the general idea transmitted by GGDC: although GDP per capita slowdown was similar in Portugal and in Spain, productivity slowdown was much stronger in Portugal than in Spain.

Conclusion

Ameco and GGDC datasets lead to two contrasting pictures of the performance of the Portuguese economy during the slowdown period of the mid-1970s. Although they display virtually no difference in terms of GDP per capita, the same does not occur with GDP per worker, with Ameco showing higher rates in that period. These differences lead to two entirely different stories about the performance of the Portuguese economy during the mid-1970s slowdown. Whereas GGDC data indicate a very poor Portuguese performance in terms of productivity from the mid-1970s to the mid-1980s, Ameco's indicate the opposite.

I showed in this paper that the reason for this is the different employment data used in the two data sets and that the origin of the problem is the low quality of the official population statistics from the 1960s to 1973. In order to tackle this problem I built new and more reliable series for population, employment, hours of work, and consequently, for GDP per capita, per worker, and per worker-hour in Portugal from 1950 to 2007. Although imperfect, I believe the new series are considerably better than those available until now.

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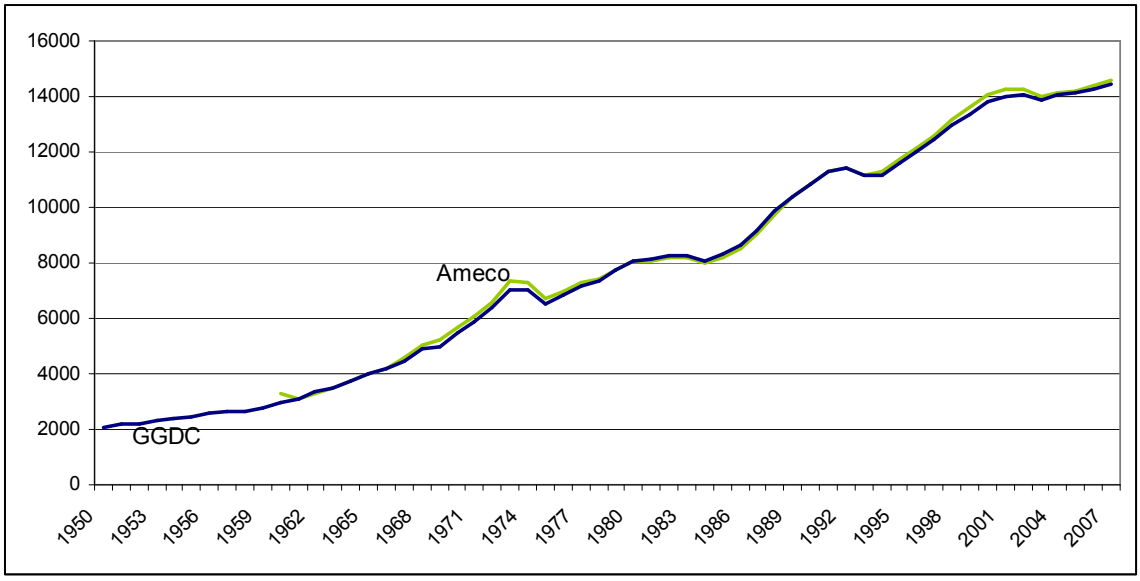
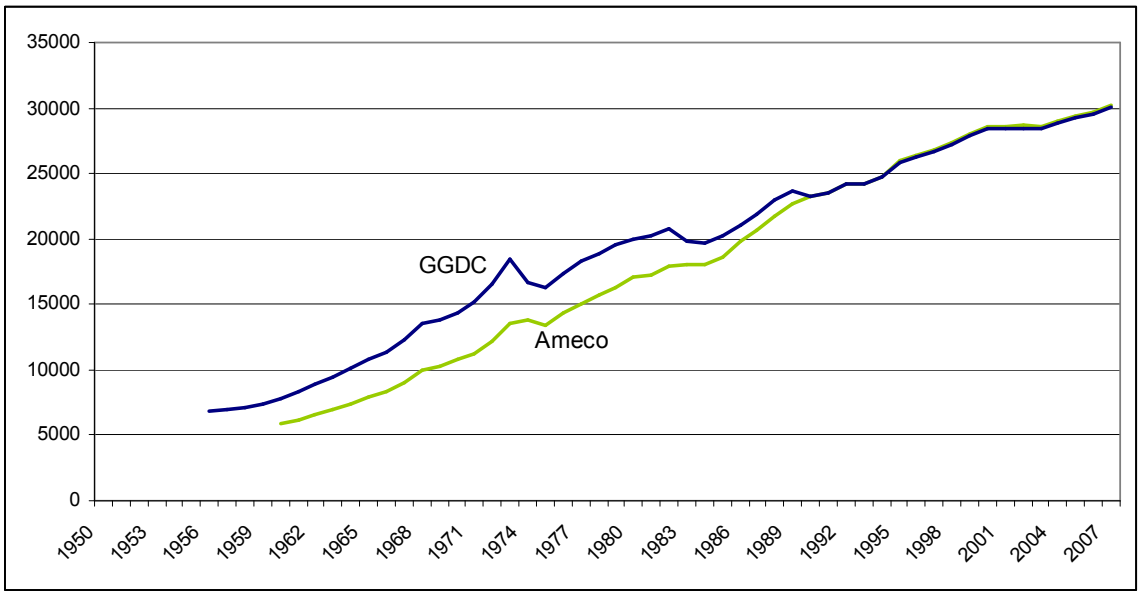
Table and Figures

Figure 1
GDP per capita, Portugal, 1950-2007 (PPP 1990 Geary-Khamis dollars)



Source: Ameco and GGDC

Figure 2
GDP per worker, Portugal, 1950-2007 (PPP 1990 Geary-Khamis dollars)



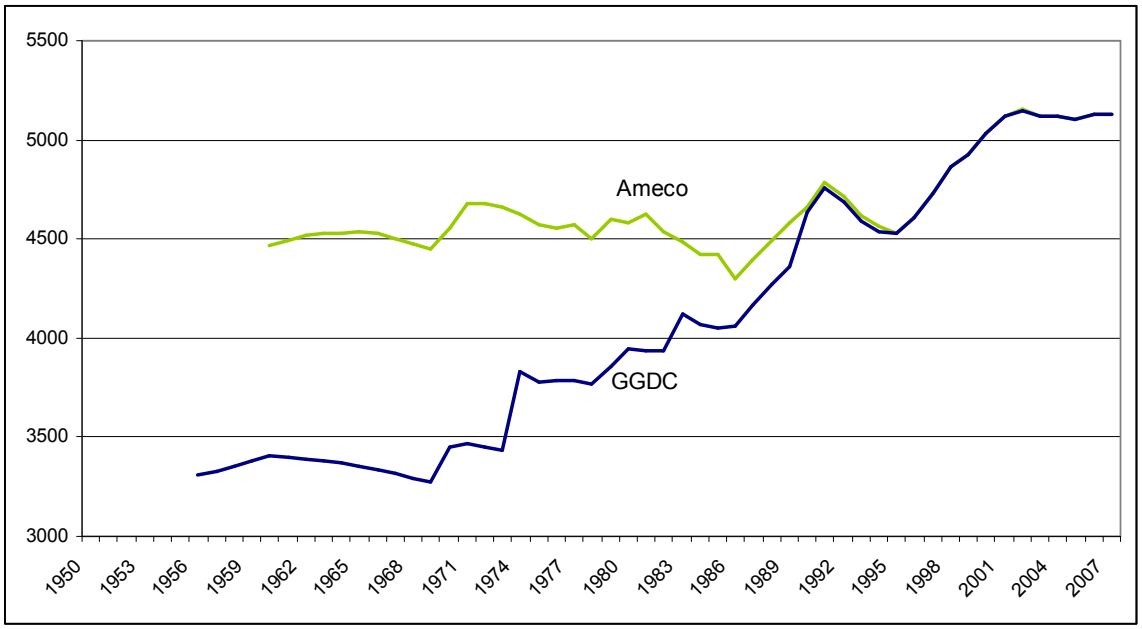
Source: Ameco and GGDC

Table I
Growth rates of GDP per capita, GDP per worker, and GDP per worker-hour, Portugal, 1950-2007
(PPP 1990 Geary-Khamis dollars) (%)

	GDP per capita		
	New	**GGDC**	**Ameco**
1950-1960	3.88	3.56	
1960-1973	6.54	6.95	6.43
1973-1986	1.73	1.62	1.21
1986-2000	3.95	3.44	3.67
2000-2007	0.45	0.65	0.55
	GDP per worker		
	New	**GGDC**	**Ameco**
1950-1960	3.85	4.17	
1960-1973	6.19	6.83	6.61
1973-1986	1.85	1.13	3.01
1986-2000	2.25	2.16	2.63
2000-2007	0.77	0.81	0.83
	GDP per worker-hour		
	New	**GGDC**	
1950-1960	2.28	4.87	
1960-1973	6.09	7.51	
1973-1986	2.93	1.83	
1986-2000	2.50	2.34	
2000-2007	0.85	0.89	

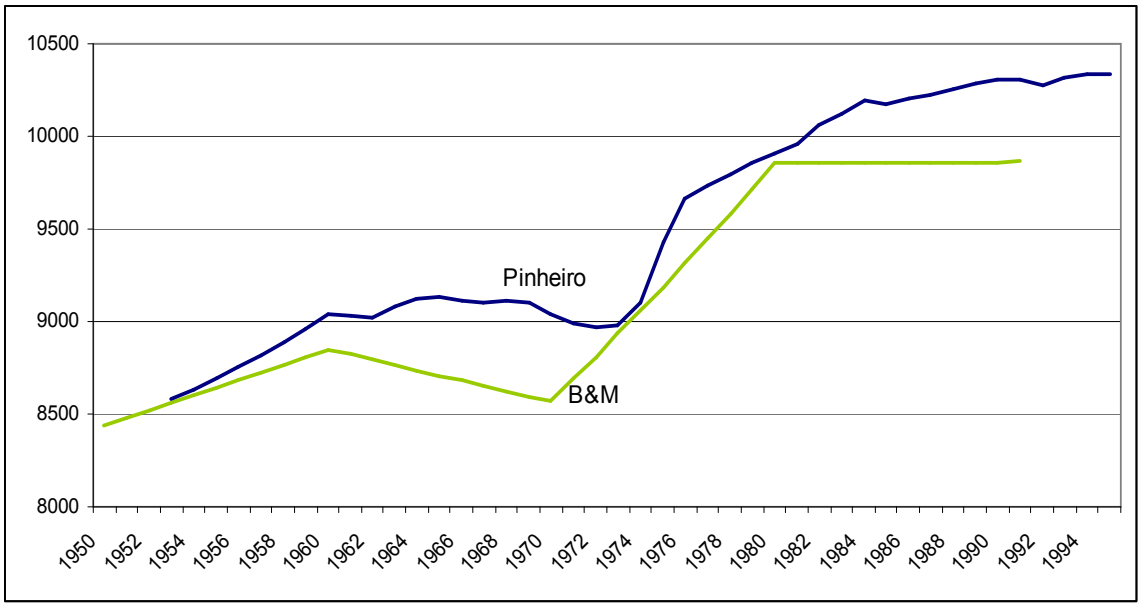
Source: Ameco and GGDC; for the new series, see text

Figure 3
Employment, Portugal, 1950-2007 (1000 of persons)



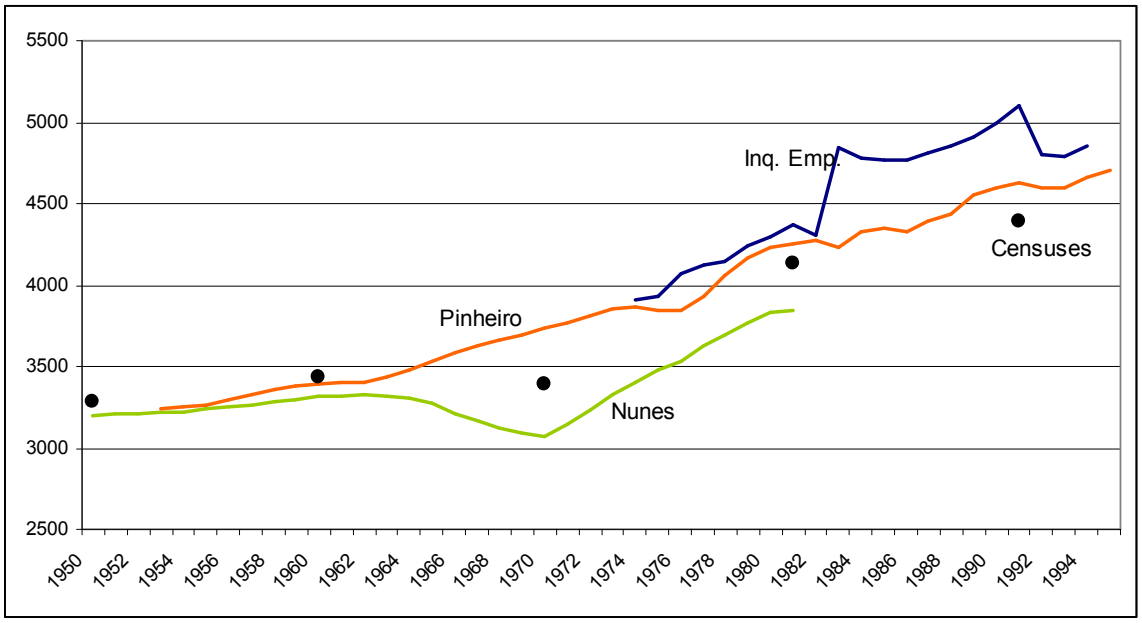
Source: Ameco and GGDC

Figure 4
Total population, Portugal, 1950-1990s (1000 of persons)



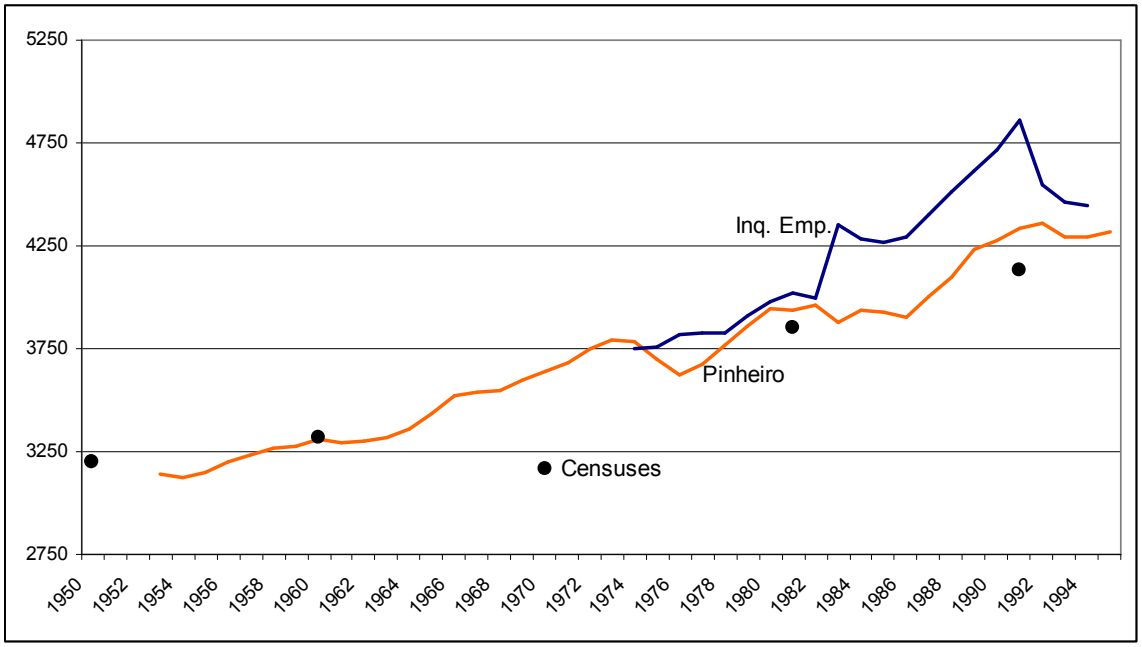
Source: Pinheiro (1997) and Baganha and Marques (2001)

Figure 5
Active population, Portugal, 1950-1990s (1000 of persons)



Source: Nunes (1989), Pinheiro (1997), Nunes, (2001) and INE (1974-1982 and 1983-1994)

Figure 6
Employment, Portugal, 1950-1990s (1000 of persons)



Source: Pinheiro (1997), Nunes, (2001) and INE (1974-1982 and 1983-1994)

Table II
Emigration, Portugal, 1950-1988

Year	Legal	Illegal	Total
1950	21892		
1951	33664	351	34015
1952	47018	389	47407
1953	39686	276	39962
1954	41011	179	41190
1955	29796	351	30147
1956	27017	1079	28095
1957	35356	1538	36894
1958	34030	1570	35600
1959	33458	1296	34754
1960	32318	2841	35159
1961	33526	5046	38572
1962	33539	9463	43002
1963	37829	17389	55218
1964	43320	32256	75576
1965	62752	28736	91488
1966	91607	20388	111995
1967	78515	16197	94712
1968	68981	27246	96227
1969	70165	85507	155672
1970	66360	116845	183205
1971	50400	108073	158473
1972	54084	61461	115545
1973	79517	50215	129732
1974	43397	37462	80859
1975	24811	27675	52486
1976	17493	21699	39192
1977	17226	16450	33676
1978	18659	10199	28858
1979	20574	8152	28726
1980	18071	13710	31781
1981	16513	14721	31234
1982	10276	5324	15600
1983	7276	5521	12797
1984	6556	3972	10528
1985	7149	2396	9545
1986	6253	878	7131
1987	8108		8108
1988	8540		8540

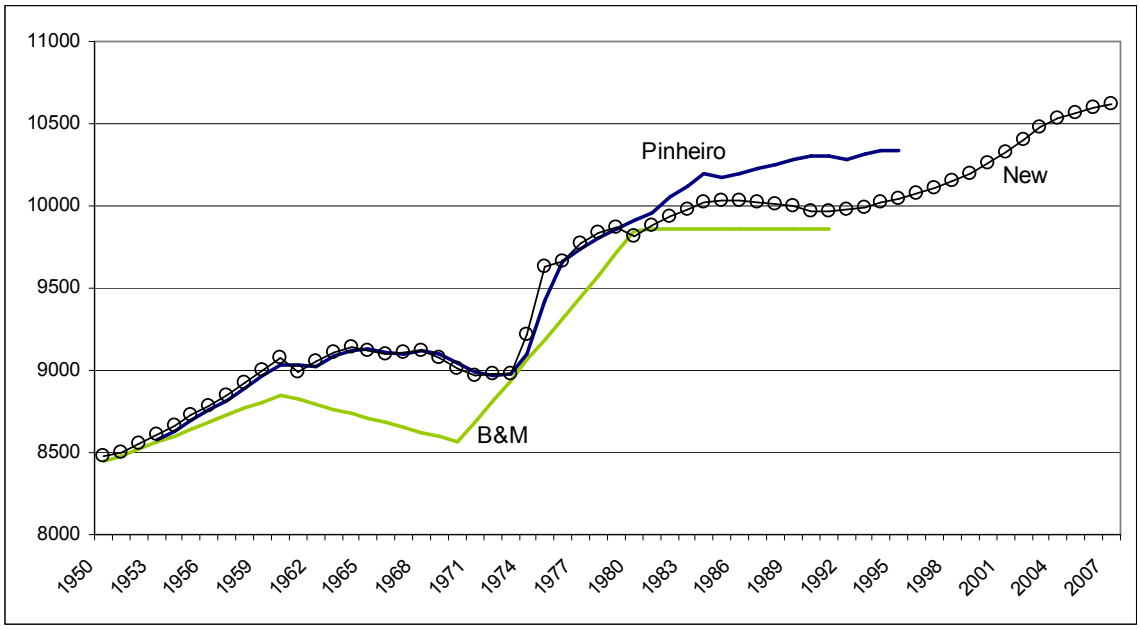
Source: Baganha (1994)

Table III
Mainland conscripts in the African Wars

Year	Registered	Called	% of registered	Deserters	% of registered
1961	75,366	48,832	64.8	8,722	11.6
1962	79,357	57,073	72.0	10,211	12.8
1963	85,410	59,676	69.8	13,328	15.6
1964	86,977	61,249	70.4	14,357	16.5
1965	90,289	64,805	71.1	16,972	18.8
1966	87,506	63,342	72.3	16,008	18.4
1967	86,065	62,017	72.6	16,512	19.2
1968	95,634	70,504	73.7	17,838	18.6
1969	-	-	-	-	-
1970	88,693	63,996	71.5	18,554	20.9
1971	91,363	65,746	72.0	15,644	20.3
1972	92,613	66,681	72.0	18,841	20.3

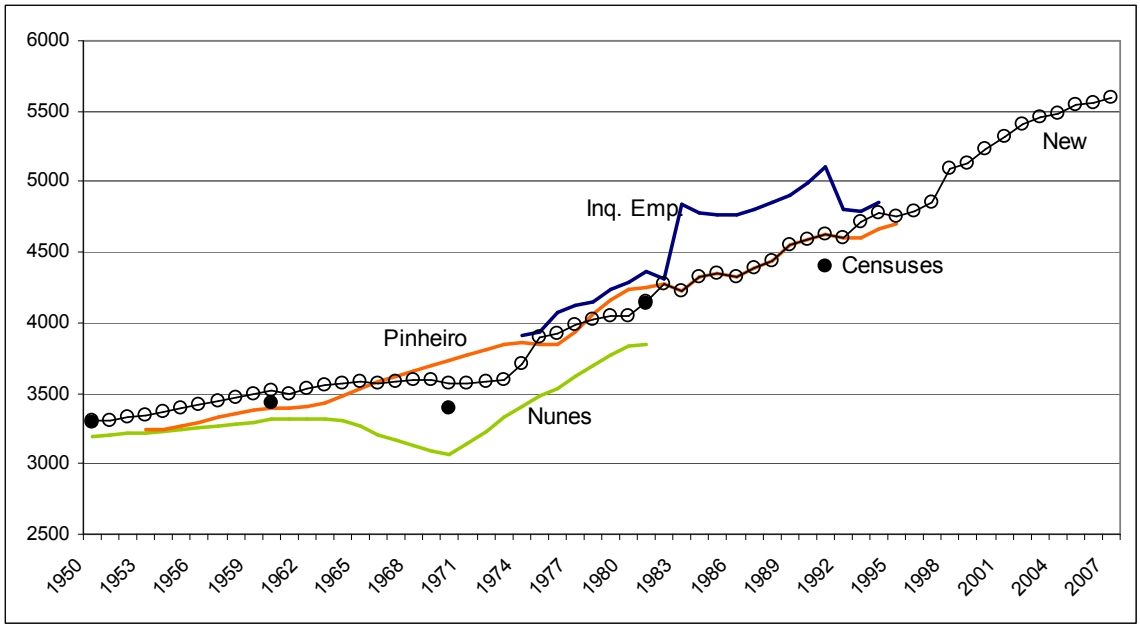
Source: Cann (1998)

Figure 7
Total population, Portugal, 1950-2007 (1000 of persons)



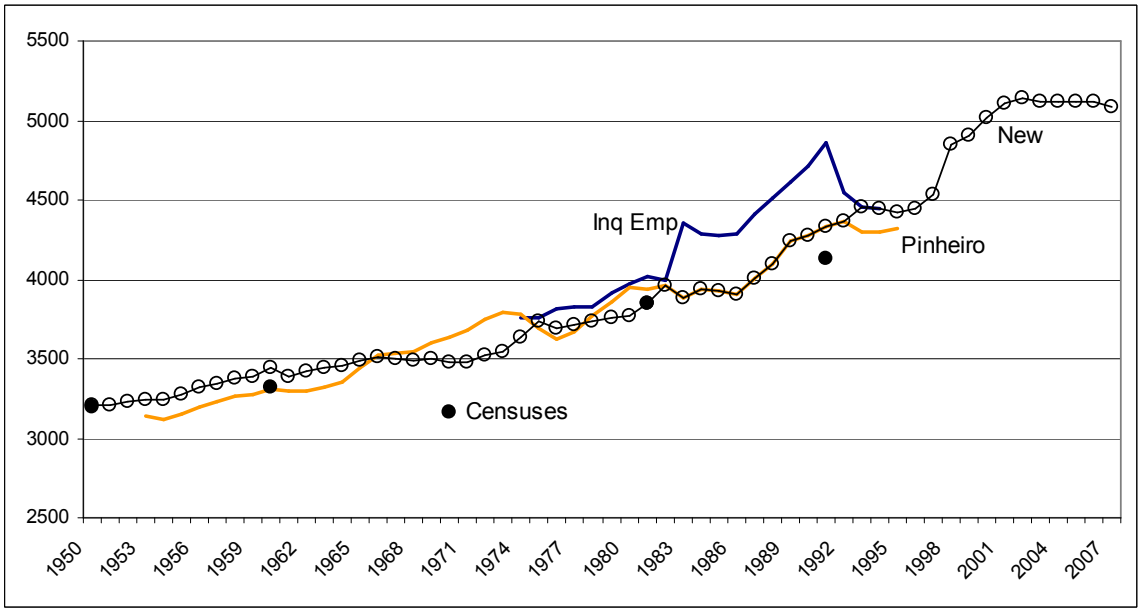
Source: Pinheiro (1997) and Baganha and Marques (2001); for the new series, see text

Figure 8
Active population, Portugal, 1950-2007 (1000 of persons)



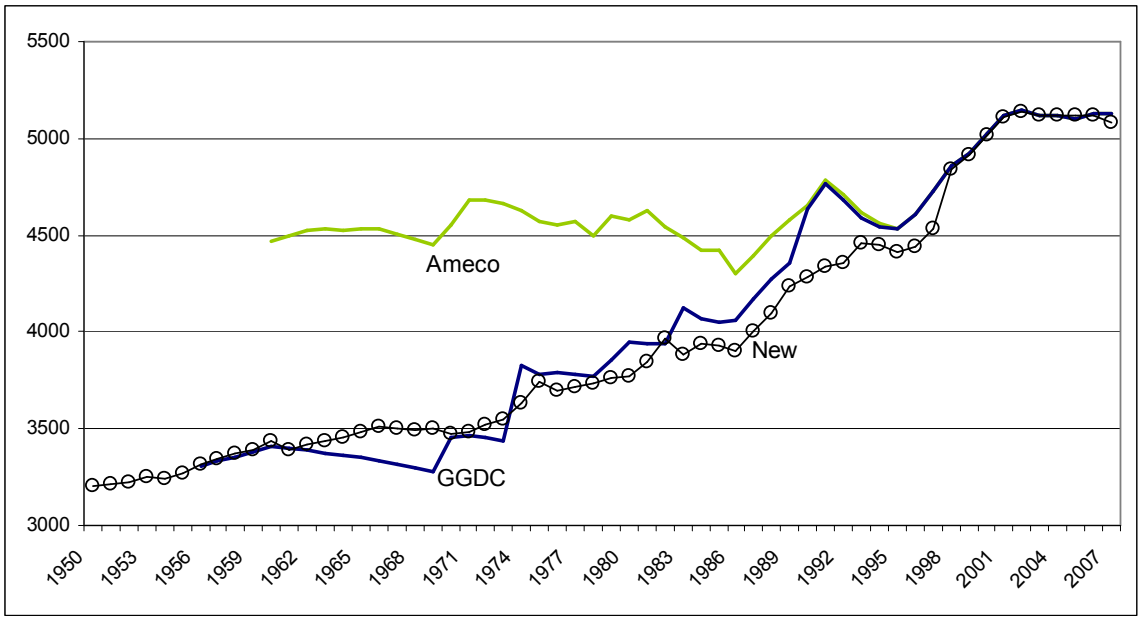
Source: Nunes (1989), Pinheiro (1997), Nunes, (2001) and INE (1974-1994); for the new series, see text

Figure 9
Employment, Portugal, 1950-2007 (1000 of persons)



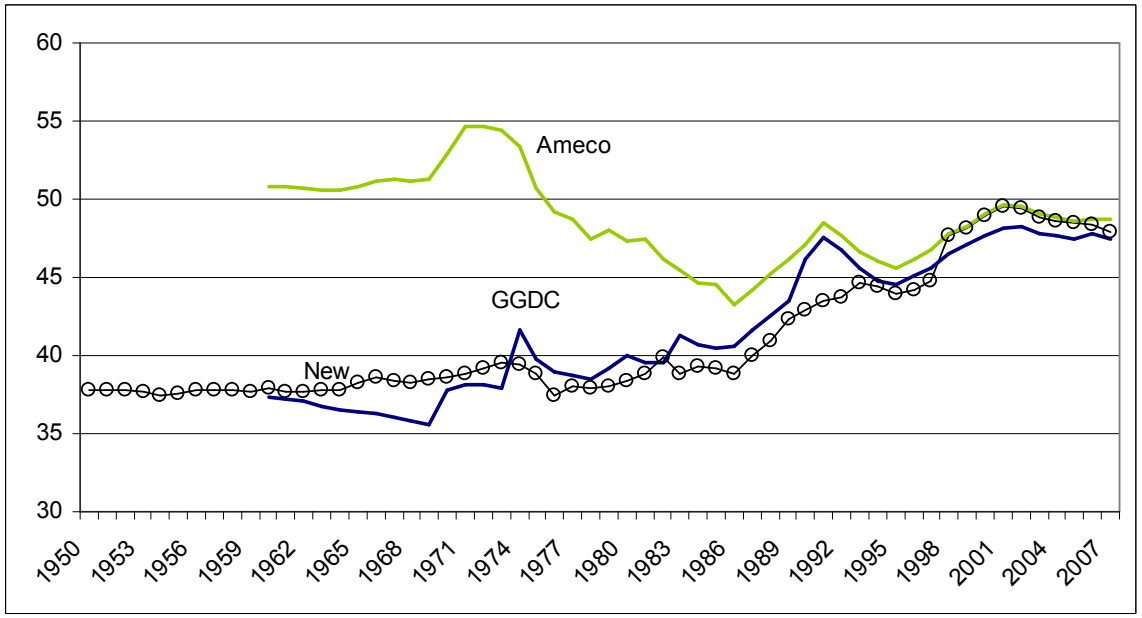
Source: Pinheiro (1997), Nunes, (2001) and INE (1974-1994); for the new series, see text

Figure 10
Employment, Portugal, 1950-2007 (1000 of persons)



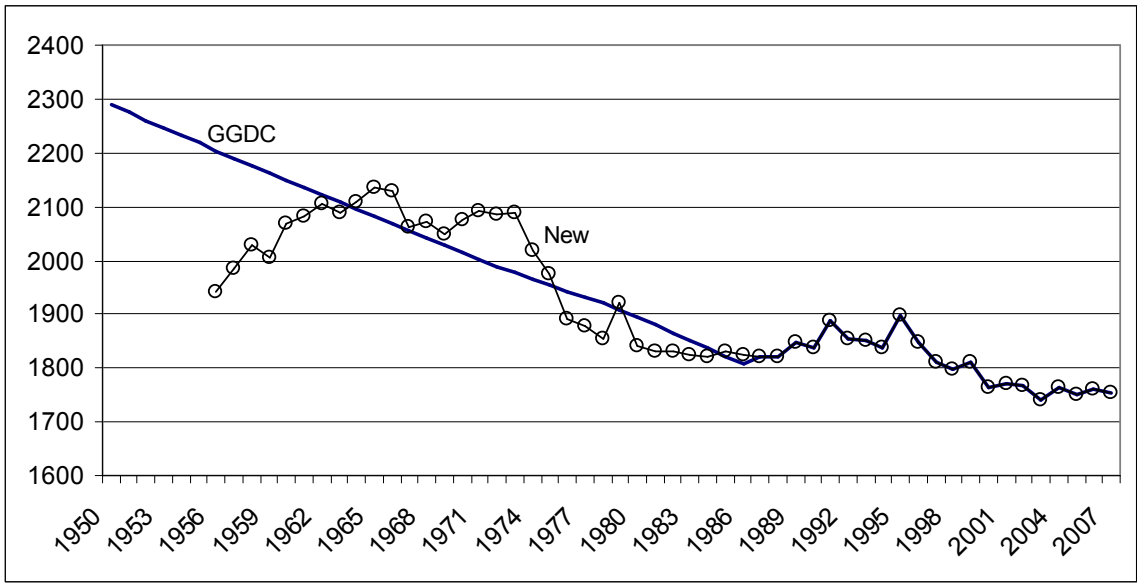
Source: Ameco and GGDC; for the new series, see text

Figure 11
Employment rate, Portugal, 1950-2007 (%)



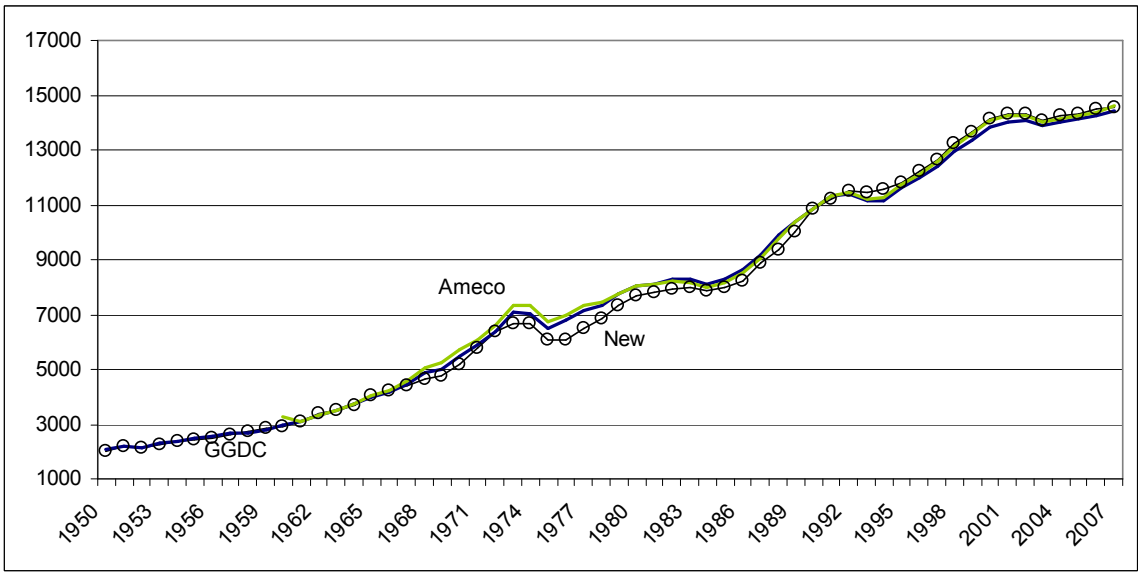
Source: Ameco and GGDC; for the new series, see text

Figure 12
Annual hours of work, Portugal, 1950-2007



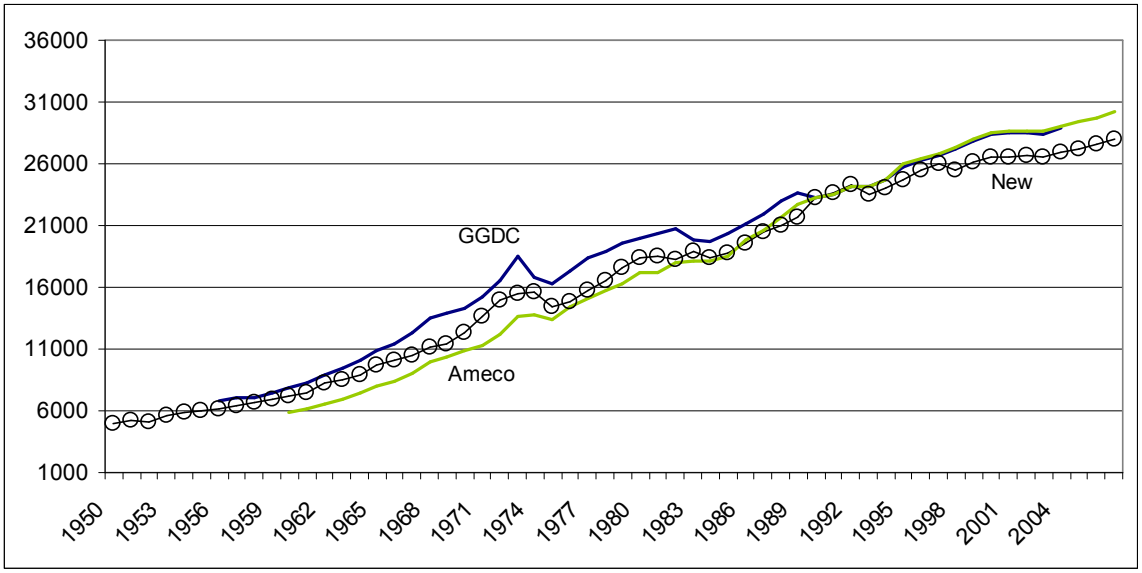
Source: GGDC; for the new series, see text

Figure 13
GDP per capita, Portugal, 1950-2007 (PPP 1990 Geary-Khamis dollars)



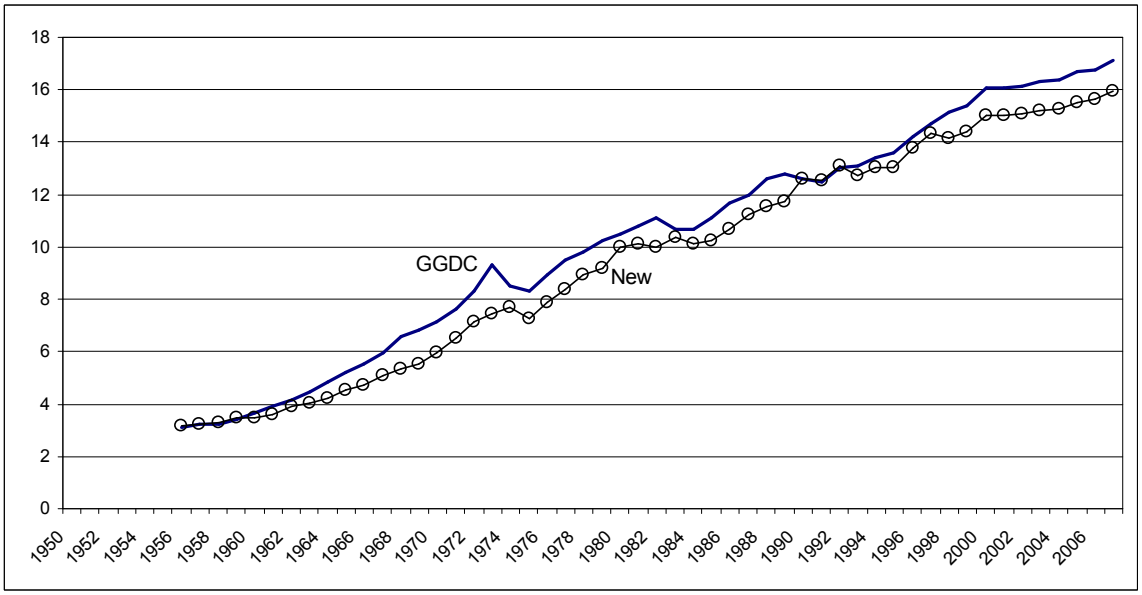
Source: Ameco and GGDC; for the new series, see text

Figure 14
GDP per worker, Portugal, 1950-2007 (PPP 1990 Geary-Khamis dollars)



Source: Ameco and GGDC; for the new series, see text

Figure 15
GDP per worker-hour, Portugal, 1950-2007 (PPP 1990 Geary-Khamis dollars)



Source: GGDC; for the new series, see text

Table IV
Growth rates of GDP per capita, GDP per worker, and GDP per worker-hour, Portugal and Spain, 1950-2007 (%)

Period	Portugal				Spain	
	GDP per capita				GDP per capita	
	New	GGDC	Ameco		GGDC	Ameco
1950-1960	3.88	3.56			4.03	
1960-1973	6.54	6.95	6.43		7.24	5.99
1973-1986	1.73	1.62	1.21		1.72	0.87
1986-2000	3.95	3.44	3.67		3.14	3.09
2000-2007	0.45	0.65	0.55		1.84	1.84
	GDP per worker				GDP per worker	
	New	GGDC	Ameco		GGDC	Ameco
1950-1960	3.85	4.17			5.24	
1960-1973	6.19	6.83	6.61		7.44	6.40
1973-1986	1.85	1.13	3.01		3.86	2.92
1986-2000	2.25	2.16	2.63		1.24	1.05
2000-2007	0.77	0.81	0.83		-0.44	0.53
	GDP per worker-hour				GDP per worker-hour	
	New	GGDC			GGDC	
1950-1960	2.28	4.87			5.39	
1960-1973	6.09	7.51			7.12	
1973-1986	2.93	1.83			5.06	
1986-2000	2.50	2.34			1.20	
2000-2007	0.85	0.89			0.87	

Source: Ameco and GGDC; for the new series, see text

Appendix

Series

Table A.I

Total Population, Portugal, 1950-2007 (1000 of persons)

1950	8480	**1981**	9884
1951	8501	**1982**	9940
1952	8552	**1983**	9976
1953	8606	**1984**	10017
1954	8658	**1985**	10031
1955	8727	**1986**	10035
1956	8785	**1987**	10025
1957	8851	**1988**	10014
1958	8926	**1989**	9996
1959	8997	**1990**	9970
1960	9077	**1991**	9965
1961	8986	**1992**	9974
1962	9054	**1993**	9991
1963	9109	**1994**	10018
1964	9136	**1995**	10043
1965	9122	**1996**	10072
1966	9096	**1997**	10110
1967	9110	**1998**	10149
1968	9120	**1999**	10195
1969	9075	**2000**	10257
1970	9014	**2001**	10329
1971	8967	**2002**	10407
1972	8974	**2003**	10475
1973	8978	**2004**	10529
1974	9218	**2005**	10570
1975	9633	**2006**	10599
1976	9877	**2007**	10618
1977	9770		
1978	9838		
1979	9874		
1980	9819		

Table A.II

Active Population, Portugal, 1950-2007 (1000 of persons)

1950	3303	**1981**	4147
1951	3310	**1982**	4269
1952	3329	**1983**	4231
1953	3349	**1984**	4330
1954	3368	**1985**	4348
1955	3393	**1986**	4327
1956	3415	**1987**	4389
1957	3439	**1988**	4436
1958	3467	**1989**	4557
1959	3494	**1990**	4593
1960	3523	**1991**	4629
1961	3495	**1992**	4601
1962	3529	**1993**	4715
1963	3558	**1994**	4773
1964	3576	**1995**	4754
1965	3578	**1996**	4789
1966	3575	**1997**	4854
1967	3588	**1998**	5096
1968	3600	**1999**	5136
1969	3589	**2000**	5226
1970	3572	**2001**	5325
1971	3568	**2002**	5408
1972	3585	**2003**	5460
1973	3600	**2004**	5488
1974	3711	**2005**	5545
1975	3893	**2006**	5565
1976	3919	**2007**	5592
1977	3980		
1978	4024		
1979	4054		
1980	4047		

Table A.III

Employment, Portugal, 1950-2007 (1000 of persons)

1950	8480	**1981**	3844
1951	8501	**1982**	3965
1952	8552	**1983**	3879
1953	8606	**1984**	3937
1954	8658	**1985**	3932
1955	8727	**1986**	3900
1956	8785	**1987**	4007
1957	8851	**1988**	4096
1958	8926	**1989**	4236
1959	8997	**1990**	4279
1960	9077	**1991**	4335
1961	8986	**1992**	4360
1962	9054	**1993**	4458
1963	9109	**1994**	4449
1964	9136	**1995**	4416
1965	9122	**1996**	4445
1966	9096	**1997**	4530
1967	9110	**1998**	4844
1968	9120	**1999**	4910
1969	9075	**2000**	5021
1970	9014	**2001**	5112
1971	8967	**2002**	5137
1972	8974	**2003**	5118
1973	8978	**2004**	5123
1974	9218	**2005**	5123
1975	9633	**2006**	5123
1976	9877	**2007**	5084
1977	9770		
1978	9838		
1979	9874		
1980	9819		

Table A.IV

Annual Hours of Work, Portugal, 1950-2007

1956	1940	**1982**	1830
1957	1985	**1983**	1826
1958	2029	**1984**	1821
1959	2004	**1985**	1830
1960	2067	**1986**	1826
1961	2081	**1987**	1822
1962	2104	**1988**	1820
1963	2090	**1989**	1847
1964	2108	**1990**	1838
1965	2134	**1991**	1888
1966	2128	**1992**	1853
1967	2062	**1993**	1850
1968	2072	**1994**	1838
1969	2049	**1995**	1897
1970	2076	**1996**	1848
1971	2091	**1997**	1812
1972	2086	**1998**	1799
1973	2090	**1999**	1812
1974	2019	**2000**	1765
1975	1977	**2001**	1769
1976	1892	**2002**	1767
1977	1877	**2003**	1742
1978	1854	**2004**	1763
1979	1920	**2005**	1752
1980	1840	**2006**	1762
1981	1830	**2007**	1755

Table A.V

GDP per capita, Portugal, 1950-2007 (PPP 1990 Geary-Khamis dollars)

1950	2017.35	**1981**	7811.03
1951	2165.78	**1982**	7935.05
1952	2107.72	**1983**	7983.24
1953	2282.90	**1984**	7867.73
1954	2386.67	**1985**	7985.32
1955	2441.00	**1986**	8247.13
1956	2512.30	**1987**	8885.43
1957	2608.71	**1988**	9370.19
1958	2743.53	**1989**	10011.17
1959	2830.53	**1990**	10826.16
1960	2940.01	**1991**	11196.60
1961	3076.11	**1992**	11536.64
1962	3374.44	**1993**	11437.85
1963	3482.85	**1994**	11576.90
1964	3682.76	**1995**	11814.53
1965	4035.53	**1996**	12207.82
1966	4231.35	**1997**	12670.27
1967	4400.32	**1998**	13232.01
1968	4618.48	**1999**	13675.93
1969	4754.39	**2000**	14125.11
1970	5192.22	**2001**	14309.44
1971	5766.89	**2002**	14310.01
1972	6360.43	**2003**	14102.65
1973	6670.45	**2004**	14242.95
1974	6686.14	**2005**	14316.79
1975	6072.10	**2006**	14472.92
1976	6057.57	**2007**	14577.04
1977	6492.36		
1978	6844.99		
1979	7304.44		
1980	7695.38		

Table A.VI

GDP per worker, Portugal, 1950-2007 (PPP 1990 Geary-Khamis dollars)

1950	4910.50	**1981**	18464.10
1951	5273.58	**1982**	18285.62
1952	5134.41	**1983**	18872.65
1953	5562.76	**1984**	18400.88
1954	5867.89	**1985**	18725.78
1955	5983.26	**1986**	19506.20
1956	6119.62	**1987**	20434.32
1957	6354.54	**1988**	21057.80
1958	6677.84	**1989**	21715.62
1959	6904.97	**1990**	23186.97
1960	7132.77	**1991**	23658.72
1961	7499.59	**1992**	24261.59
1962	8221.11	**1993**	23562.99
1963	8477.91	**1994**	23962.25
1964	8952.98	**1995**	24698.33
1965	9708.47	**1996**	25427.23
1966	10076.92	**1997**	25992.97
1967	10534.03	**1998**	25483.66
1968	11089.74	**1999**	26102.35
1969	11338.49	**2000**	26523.99
1970	12371.42	**2001**	26577.06
1971	13649.06	**2002**	26648.51
1972	14898.45	**2003**	26532.09
1973	15511.80	**2004**	26907.89
1974	15593.84	**2005**	27152.71
1975	14377.73	**2006**	27524.12
1976	14880.58	**2007**	27985.42
1977	15700.70		
1978	16585.01		
1979	17641.35		
1980	18433.13		

Table A.VI

GDP per worker-hour, Portugal, 1950-2007 (PPP 1990 Geary-Khamis dollars)

1956	3.15	**1982**	9.99
1957	3.20	**1983**	10.34
1958	3.29	**1984**	10.10
1959	3.45	**1985**	10.23
1960	3.45	**1986**	10.68
1961	3.60	**1987**	11.22
1962	3.91	**1988**	11.57
1963	4.06	**1989**	11.75
1964	4.25	**1990**	12.61
1965	4.55	**1991**	12.53
1966	4.73	**1992**	13.09
1967	5.11	**1993**	12.73
1968	5.35	**1994**	13.03
1969	5.53	**1995**	13.02
1970	5.96	**1996**	13.76
1971	6.53	**1997**	14.34
1972	7.14	**1998**	14.16
1973	7.42	**1999**	14.40
1974	7.72	**2000**	15.03
1975	7.27	**2001**	15.02
1976	7.87	**2002**	15.08
1977	8.36	**2003**	15.23
1978	8.94	**2004**	15.26
1979	9.19	**2005**	15.50
1980	10.02	**2006**	15.62
1981	10.09	**2007**	15.94